High Forage Yields

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High Forage Yields

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How To Get High Forage Yields

1. Use the proper seeding mixture.
2. Secure a good stand with high yield potential.
3. Fertilize and lime for maximum production.
4. Harvest at the right time.
5. Check yields to measure performance.

Seeding Mixtures

Several factors should be considered in selecting the seeding mixture. Major factors are discussed here; for more complete information see Extension Bulletin No. 380, "Meadow and Pasture Seedings."

Which Legume

Alfalfa—On moderate to well drained soils with pH values of 6.0 or higher, alfalfa is the highest yielding perennial legume available to Ohio farmers. Where alfalfa is the only legume in the mixture, sow 10 pounds of alfalfa per acre. For spring seedings in winter grains sow 7 pounds of alfalfa and 3 pounds of red clover per acre.

Red Clover—In the first hay year, yields of red clover-grass mixtures are nearly equal to alfalfa-grass mixtures.

Red clover-grass mixtures may be used on fields to remain in sod for only one year, and for longer rotations on soils which will not support satisfactory stands and growth of alfalfa. Where red clover is the only legume in the seeding mixture, sow 7 pounds of red clover per acre.

Birdsfoot Trefoil—Although it is primarily a pasture legume, hay yields from birdsfoot-grass mixtures grown on poorly drained soils in northeastern Ohio frequently exceed those of alfalfa mix-

tures. Other legumes should not be seeded with birdsfoot trefoil; the recommended seeding rate is 6 pounds of birdsfoot trefoil per acre.

For additional information see Extension Bulletin No. 401, "Birdsfoot Trefoil."

Which Grass

Timothy—The acreage of Ohio meadows seeded to timothy greatly exceeds that of all other grasses. Timothy is easy to establish in fall seeded small grains; it matures later than bromegrass or orchardgrass, and under good management remains productive for several years. Timothy produces less summer growth than bromegrass or orchardgrass.

For fall seedings use not more than 2 pounds of timothy per acre; in spring seedings 4 pounds per acre is the recommended seeding rate.

Bromegrass—It is somewhat more difficult to secure a satisfactory stand of bromegrass than of timothy or orchardgrass. Bromegrass should be spring or summer seeded; the seed is large and chaffy, and for best results must be covered lightly. First cutting yields of bromegrass equal or exceed those of timothy. Bromegrass makes slightly more mid-summer growth than timothy. The recommended seeding rate is 6 pounds of bromegrass per acre.

Orchardgrass—This early maturing, vigorous growing grass is easy to establish. The first cutting of common orchardgrass should be made 10 days to 2 weeks earlier than timothy; late maturing varieties bloom at about the same time as timothy. Orchardgrass makes more summer growth than timothy or bromegrass. Orchardgrass should be spring or summer seeded at 4 pounds of seed per acre.

Basic Seeding Mixtures (pounds per acre)

1)	Alfalfa 10	with	Timothy *or* Bromegrass 6 *or* Orchardgrass 4	2 (Fall)	4 (Spring)
2)	Alfalfa 7 Red Clover 3	with	Timothy *or* Bromegrass 6 *or* Orchardgrass 4	2 (Fall)	4 (Spring)

3) Red Clover 7	with	Timothy *or* Bromegrass 6 *or* Orchardgrass 4	2 (Fall)	4 (Spring)
4) Birdsfoot Trefoil 6	with	Timothy 4 *or* Bluegrass 1–2		
Birdsfoot Trefoil alone 6				

A Good Stand

Forage yields are frequently limited by inadequate stands. Follow the steps listed below to obtain good stands of grasses and legumes.

Correct Lime and Soil Fertility Deficits

Soil tests furnish the best guide to fertilizer and lime needs. Follow **soil test recommendations** to assure a good start and vigorous seedling growth.

Seed on Time

	Recommended Seeding Dates	
	Southern Ohio	Northern Ohio
Seeding in fall-sown small grains		
Alfalfa, Red Clover, Birdsfoot Trefoil	March	March 10-April 10
Timothy	At time of seeding wheat	
Bromegrass, Orchardgrass	March	March 10-April 10
Seeding in spring-sown small grains	At time of seeding the small grain	
Summer seedings		
Alfalfa, Timothy	Band Seed	Band Seed
Bromegrass, Orchardgrass	Aug. 1-Sept. 15	Aug. 1-Sept. 1

Soil moisture is of major importance in summer seedings.

Early spring seeding of forages in winter grains permits the forage seedlings to become established before the grain begins rapid spring growth. The soil does not need to be "honeycombed" at the time of seeding. Seeding on frozen ground is satisfactory. In some years January and February seedings give excellent stands. However, they are not recommended because in many years young seedlings will be killed by low temperatures.

On low phosphorus soils which received only moderate fall fertilization the new seeding will be benefited by drilling phosphate fertilizer with the forage seed. 200–300 pounds per acre of 0–20–0 or equivalent are recommended. **The forage seeding should not be delayed** beyond the recommended dates. If the soil is too wet to support fertilizing equipment, broadcast the forage seed on time and apply the fertilizer after grain harvest.

Band Seed-Use Packer Wheels

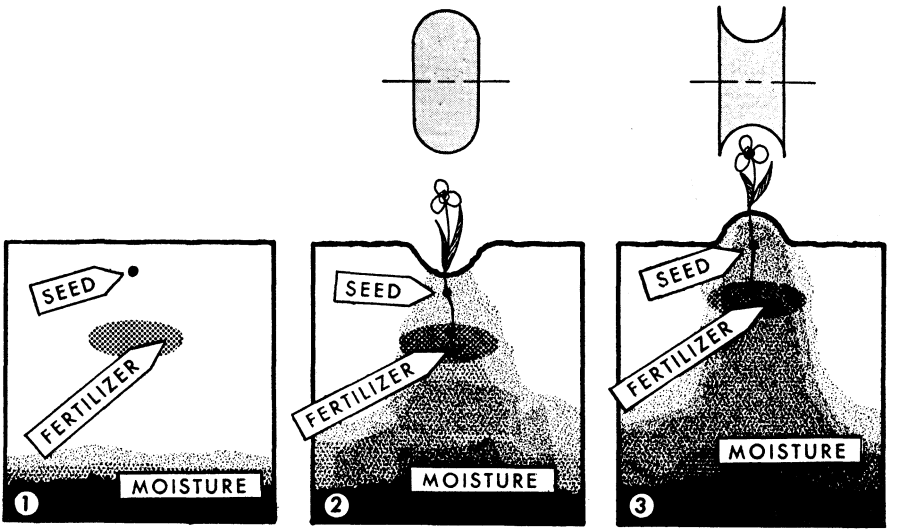


Figure 1

1. No Packer Wheel—Loose, dry soil, slow germination
2. Convex Packer Wheel—Firm, moist soil, quick germination
3. Concave Packer Wheel—Firm, moist soil, quick germination, less cresting, better emergence

Reduce Summer Competition

Many new forage seedings are severely damaged during late June and July by shading and by competition with other plants for moisture and nutrients. Where small grains make such rank growth that seedings are likely to fail, two possible alternatives are:

1) Summer seed following small grain harvest. Alfalfa and the meadow grasses are well adapted to summer seedings. Summer seeding is not recommended for clovers or birdsfoot trefoil.

2) Harvest the small grain as hay, silage or pasture. Early removal of the small grain eliminates shading and competition with the forage seedings and insures more vigorous forage stands.

Where small grains do not make excessive growth, satisfactory forage stands are obtained in companion crops harvested as grain. In such situations the grain stubble should be clipped and the combined straw and stubble removed as soon as possible after grain harvest. **In clipping small grain stubble, adjust the mower to cut low.** Alfalfa, red clover, and birdsfoot trefoil regrow from the crown and are not damaged by low clipping; many weeds regrow from buds on the stem and thus are not controlled by clipping high.

Clip or Graze by September 1

New seedings which have made considerable summer growth may be harvested as hay or pasture during late August. Fields to be pastured should be stocked with enough livestock to consume the available forage during a period of a week to 10 days. Grazing for a longer period may result in some loss of legume stands.

Lime and Fertilize for Maximum Yields

Lime

To take full advantage of high-yielding legumes, the pH of the plow layer should be maintained in the range of 6.5–7.0. Too acid a soil is frequently the cause of legume failure and the early running-out of many legume stands.

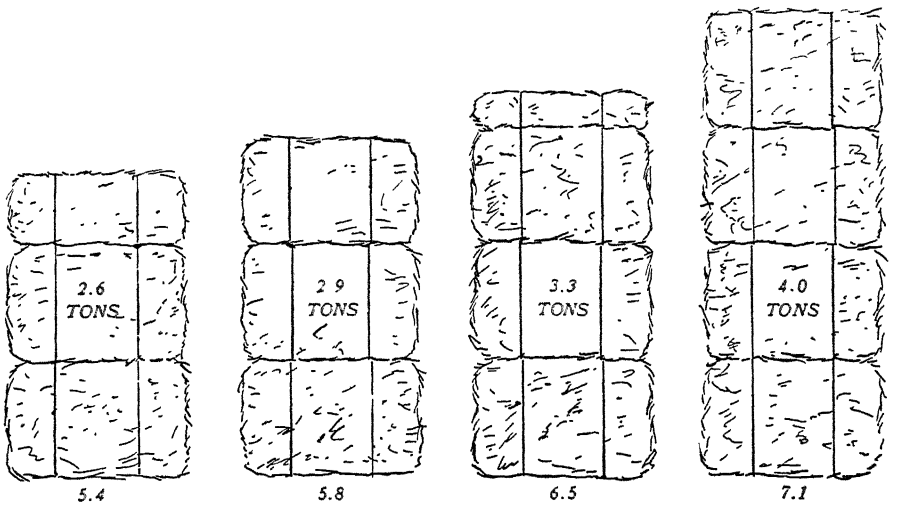
The natural pH of the plow layer of Ohio soils ranges from an extreme low of about 4.0 in eastern and northeastern Ohio to a high of about 7.5 in isolated areas of western Ohio. The more acid the soil is naturally, the more essential it is that adequate amounts of lime, as well as fertilizer, be applied for profitable yields.

Forage Fertilization

High-yielding forage crops contain large amounts of nutrients. Five tons of hay contain approximately 200 pounds of nitrogen (N), 50 pounds of phosphate (P_2O_5) and 200 pounds of potash (K_2O). These nutrients must be supplied from the soil, organic matter, manure, or commercial fertilizer. (Inoculated legumes can supply most of their nitrogen need from the air.) **Soil tests furnish the best guide to fertilizer needs.**

Figure II. The Effect of Soil Reaction on Hay Yield

(O.A.E.S.—Wooster)



1) **NITROGEN—**

a) Nitrogen fertilizers applied on legume-grass mixtures (50% legume) decrease the percentage of legume in the forage and give only slight yield increases as indicated in Figure 3.

b) With adequate nitrogen fertilization, grasses yield as much dry matter and protein per acre as legumes or legume-grass mixtures.

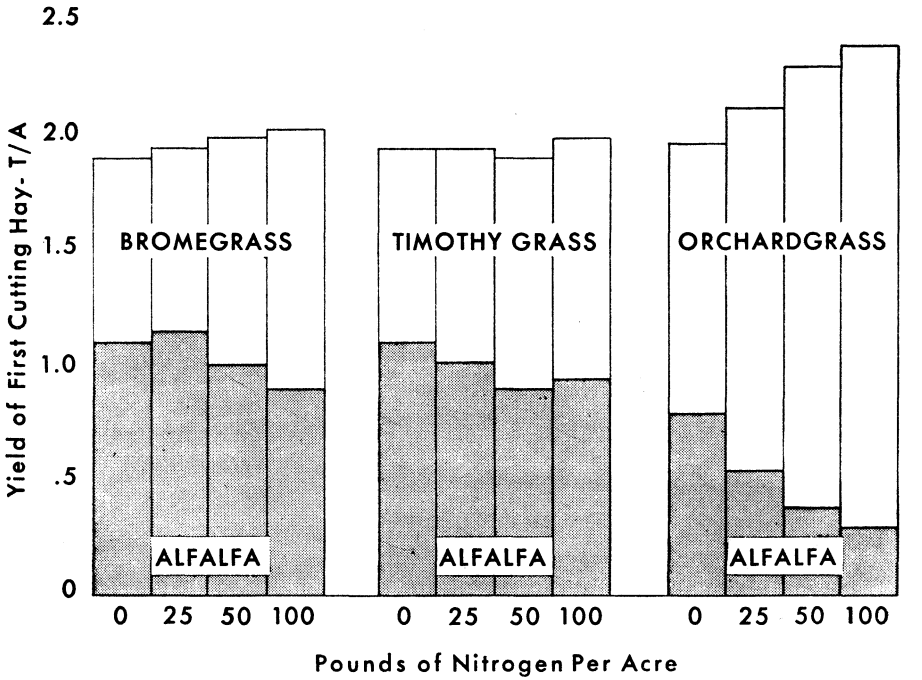
TABLE 1—Yields and Protein Production of Grasses Fertilized with Nitrogen vs. Grasses Grown with Alfalfa.*

Crop and Treatment	Dry Matter Tons/Acre	Protein Lb/Acre
Orchardgrass—100 lb. N/A	3.45	604
Orchardgrass—Alfalfa	2.56	455
Bromegrass—100 lb. N/A	2.75	521
Bromegrass—Alfalfa	2.51	513
Timothy—100 lb. N/A	2.82	479
Timothy—Alfalfa	2.69	535

* Penn. State Univ. Agr. Expt. Sta. Bul. 611, p. 21, 1956. Washko and Pennington.

Figure III. The Effect of Nitrogen Fertilization on Hay Yields and Legume Content of Grass-Legume Mixtures

(O.A.E.S.—Wooster)



c) For non-legume hay crops, nitrogen is generally applied in split applications. Best responses will be obtained by making the first application early in the spring when soil moisture and other growing conditions are best. Additional nitrogen after the first and second cuttings may be profitable if there is adequate soil moisture. Orchardgrass is more responsive than bromegrass or timothy.

Apply phosphate and/or potassium as indicated by soil tests. Apply 60 to 80 pounds of nitrogen (N) per acre during early spring (March). Apply 40 to 50 pounds of nitrogen (N) per acre immediately following the first and second cuttings. With such treatment, grass hay yields will often exceed 5 tons per acre.

2) PHOSPHORUS and POTASSIUM—

a) For high yields, legumes and grasses must have ample supplies of phosphorus and potassium. Many Ohio soils furnish enough

phosphorus and potassium to grow a good first cutting, but not enough to produce good yields in later cuttings.

b) For hay stands with 50% or more legume, apply phosphorus and/or potassium as indicated by soil tests.

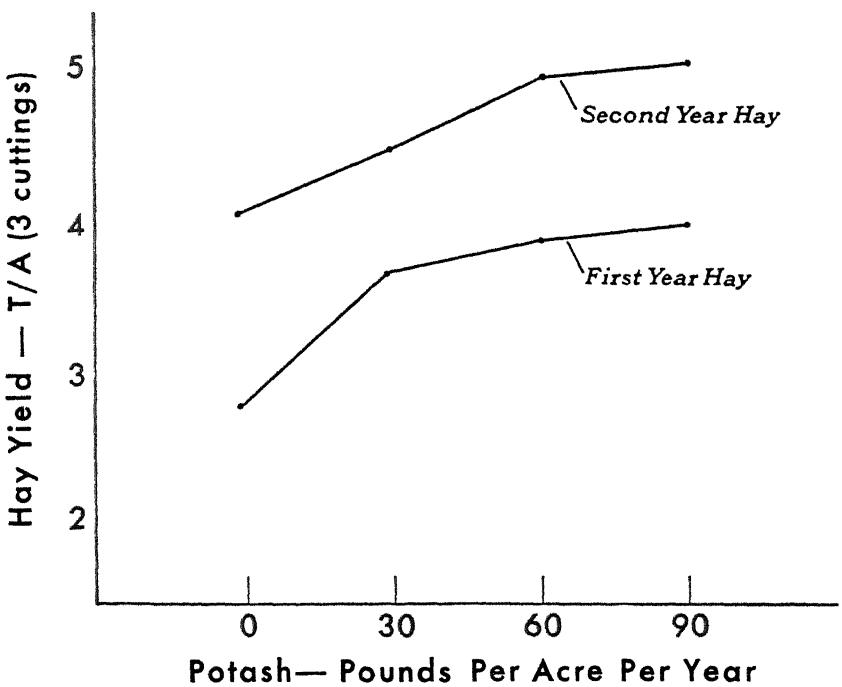
TABLE 2—Alfalfa Hay Yields at Four Levels of Soil Phosphorus. (OAES 1957)

Phosphorus Lb/Acre	Level	Alfalfa Yield* T/A	Pounds Phosphorus Removed/A
10	low	1.6	5.1
15	medium	3.2	14.0
25	medium	3.6	17.0
45	high	4.2	22.0

* 3 cuttings.
** Potash at high level.

Figure IV. Potash Helps to Obtain Maximum Meadow Yields on Land That Is Well Supplied with Lime and Phosphate

(O.A.E S.—Wooster 1953-55)



Harvest at the Right Time

For maximum production of high quality forage, harvest Ohio meadow crops as follows:

1) Make the first harvest by May 25 in southern Ohio, by June 5 in northern Ohio. Harvesting too early reduces yields and frequently results in some loss of legume stands. Late harvesting results in poor quality forage.
2) Permit 40 days regrowth between harvests (mowing or grazing). More frequent harvesting results in severe yield losses and some loss of stands.

TABLE 3—Effects of Harvest Schedules and Soil Phosphorus on Alfalfa Hay Yields. (OAES, Wooster)

	Alfalfa Hay Yields—Tons/Acre Times harvested annually		
Soil Phosphorus	5 Cuttings	4 Cuttings	3 Cuttings
Low	1.1	1.9	3.4
Medium	1.3	2.7	3.7
High	2.1	3.9	4.6

3) Make the last harvest not later than September 15 in southern Ohio. For more detailed information regarding harvest schedules see Extension Bulletin No. 413, "Harvest Schedules for Ohio Meadow Crops."

Check Yields

Forage Yields May Be Estimated From:

1) Calculations of the number of bales and the average weight per bale from a given acreage.
2) The yield of small hand-harvested samples.
3) A combination of the hand-harvest and baler methods. Use when one or two harvests are made with a baler and the other harvest(s) are made as silage, pasture, loose hay, etc.

For:

Baled hay, use the baler method.

Loose or chopped hay, use the hand-harvest method.

Silage, use the hand-harvest method.

Rotation pasture, use the hand-harvest method.

Procedures

1) **For Baler Harvest:**

   a) Carefully estimate the size of the field or area to be included in the yield check.

   b) Count the number of bales harvested.

   c) At harvest time place aside representative bales to be weighed for yield determination. Plan to weigh one bale per acre from each cuttings.

   d) When the sample bales are thoroughly air-dry (usually 4 to 5 weeks after harvest) weigh these bales and record the average weight per bale.

   e) Calculate the estimated yield per acre.

2) **For Hand-Harvested Samples:**

   a) Yield samples should be harvested not more than 24 hours prior to **each** regular hay harvest or grazing period.

   b) Individual samples should approach one square yard in area. The exact size of the harvested area must be recorded on the record sheet. A convenient harvest frame may be made of wood or light metal.

   c) Yield samples should be taken at random from the acre to be checked. Take at least one sample per acre with a minimum of three samples per field.

   d) Place the sample frame or hoop on the ground and cut all of the forage within the frame. Care must be exercised to insure an accurate harvest. Clip the sample at the **standard cutterbar height.**

   e) Place the green forage in a loosely woven bag—burlap bags with a ¼ inch mesh are ideal. Place each yield sample in a separate bag. Bags should be tagged to show the field, harvest (1st, 2nd, or 3rd), and the sample number 1, 2, 3, etc.

   f) The porous bags containing the fresh crop should be hung in a well-ventilated building for drying.

   g) Four to six weeks after harvest samples should be weighed. Air-dry weights should be recorded to the nearest 0.1 pound (milk scales are satisfactory). Samples should be weighed in the bag and the weight of the bag subtracted to obtain the net forage weight. Each cutting should be weighed separately.

   h) Record the pertinent information in the spaces provided on the record sheet and compute the estimated forage yields.

Harvest and Yield Record

Field No.....

FOR BALER HARVEST:

Harvest Date	Size of Field or Area (Acres)	Number of Bales Harvested	Average Weight per Bale	Yield Tons per Acre

Total Tons per Acre for Field.....

FOR HAND HARVEST:

Harvest Date	Size of Individual Yield Sample (Sq. Inches)	Number of Samples	Total Sample Area (Sq. Inches)	Air-Dry Weight Bags and Forage (Pounds)	Bag Weight (Pounds)	Net Forage Weight (Pounds)	Yield Per Acre (Tons)

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